



**SMALLHOLDER
DAIRY PROJECT**

Improve the Quality of Your Milk and Please Your Customers

TRAINING GUIDE FOR SMALL-SCALE INFORMAL MILK TRADERS IN KENYA

KENYA DAIRY BOARD

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Land O'Lakes Inc



MAY 2004

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AND PLEASE YOUR CUSTOMERS

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PREFACE

About this guide ...

This *Training Guide for Traders* covers milk quality and testing requirements for small-scale milk traders in Kenya. It has been produced through collaboration between:

- The Kenya Dairy Board (KDB)
- The Food and Agriculture Organization of the United Nations (FAO) Animal Production Service
- The Smallholder Dairy Research and Development Project (SDP) funded by the British Department for International Development and operated by the Ministry of Livestock and Fisheries Development the Kenya Agricultural Research Council and the International Livestock Research Institute.
- Land O'Lakes Inc.

In Kenya, small-scale milk traders currently dominate the marketing of milk. This guide is aimed at filling an important gap in the provision of training materials for improvement of milk quality in the country by addressing the specific needs of small-scale milk businesses.



There is a *Training Guide for Trainers of Small-scale Milk Traders in Kenya* that accompanies this guide for use during formal training sessions, which outlines the key lessons to impart during training that will ensure that milk traders obtain the maximum benefit from the training. The contents are easy to use and practical.

Once this course has been successfully completed, participants may wish to gain more knowledge by attending one of the certificate-level short courses on *Hygienic Milk Handling and Processing* or *Milk Testing and Quality Control* at the Naivasha Dairy Training Institute.

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LIST OF ABBREVIATIONS AND ACRONYMS

DFID	Department for International Development
FAO	Food and Agriculture Organization of the United Nations
ILRI	International Livestock Research Institute
KARI	Kenya Agricultural Research Institute
KDB	Kenya Dairy Board
LOL	Land O' Lakes
MoLFD	Ministry of Livestock and Fisheries Development
SDP	Smallholder Dairy Project
SNF	Solids-Not-Fat



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INTRODUCTION

As a milk trader, you are aware that no other food gets spoilt more easily than milk. Just as people like milk for its nutritive value, bacteria that cause milk spoilage also do. This guide is designed to help you learn how to reduce the losses caused by spoilage to allow you to increase your profits. The guide has been put together with the participation of a pilot group of small-scale raw milk traders in various parts of Kenya to ensure that the material and methods suggested are relevant, simple and practical, thus making them directly applicable within your circumstances. Improving your image as a quality milk trader should ensure customer satisfaction and more sales for your business. The guide is designed for use in a short formal training programme covering four days. However, any milk trader can also easily read and apply the illustrated instructions and methods.



FACTORS RELATED TO MILK SPOILAGE

There are many constraints or problems that milk traders face in marketing their milk. Many of these constraints or problems cause milk spoilage or are the result of it. These may include the following factors:

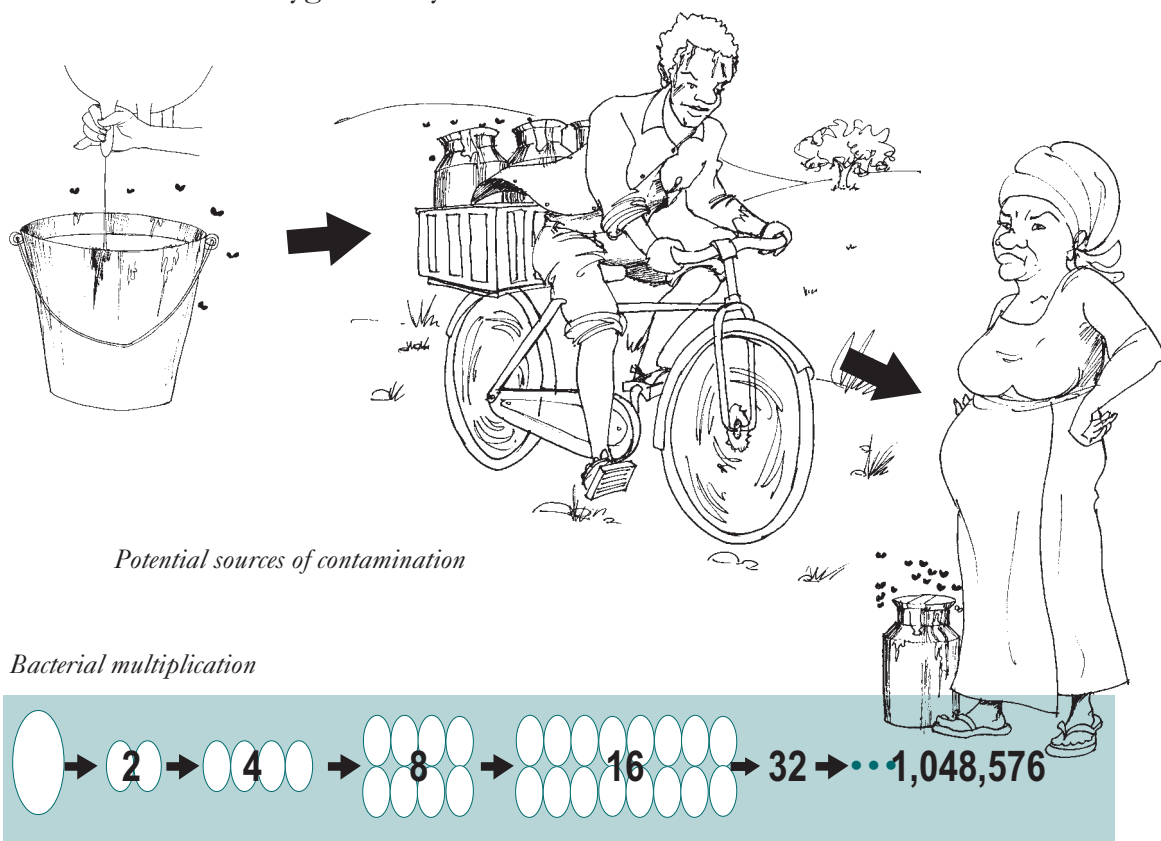
- Long distance or time between collection and resale point
- Type of containers used
- How the containers are washed
- Method of preservation
- Low profits
- Lack of training

All these factors relate to milk spoilage. Traders are aware of most of the causes and effects of milk spoilage. The relationship between the traders and various stakeholders in milk marketing, whether positive (e.g. provision of training) or negative (e.g. arrests) also has an influence on their business and the quality of milk that they sell. In a formal training session, the trainer can discuss more examples of these relationships.



WHY YOU NEED TO KNOW ABOUT MILK QUALITY CONTROL

Milk has nutrients that make it suitable for the rapid multiplication of bacteria that cause spoilage. Unhygienic production, poor handling and undesirable practices such as addition of water or other substances can introduce bacteria or germs that cause spoilage. The resulting wastage can make you lose profits that you would have otherwise made. Unhygienic handling may introduce disease-causing bacteria into the milk and this can also adversely affect human health. In addition, regulatory authorities will likely require that you undergo a training course that covers the contents of this guide before they issue you with a licence to trade in milk. This course is therefore designed to provide the relevant knowledge and skills needed to handle milk hygienically.



WHAT IS MILK QUALITY CONTROL?

Milk quality control is the practice of specified hygienic methods and use of approved tests to ensure good milk quality. The good hygienic practices and tests are designed to help reduce milk spoilage (See Section 1-3 for details on these methods and tests). You will need to practice the tests with a trainer to ensure that you are able to use them properly.

HOW TO ENSURE GOOD QUALITY MILK

Milk from the udder of a healthy cow contains very few bacteria. Poor hygiene introduces additional bacteria that make the milk spoil quickly. To ensure that the milk remains fresh for a longer time it is necessary to practice good hygiene. Good hygiene needs to be observed at all stages of milk production, handling and marketing. Therefore you need to advise the farmer on hygienic milk production and handling after milking.

1) Advice to give to farmers

Quality control must begin at the farm. That way, the milk that you collect will have fewer bacteria that cause spoilage. Below is some advice that you can give to the farmers who supply you with milk, in order to ensure good quality:

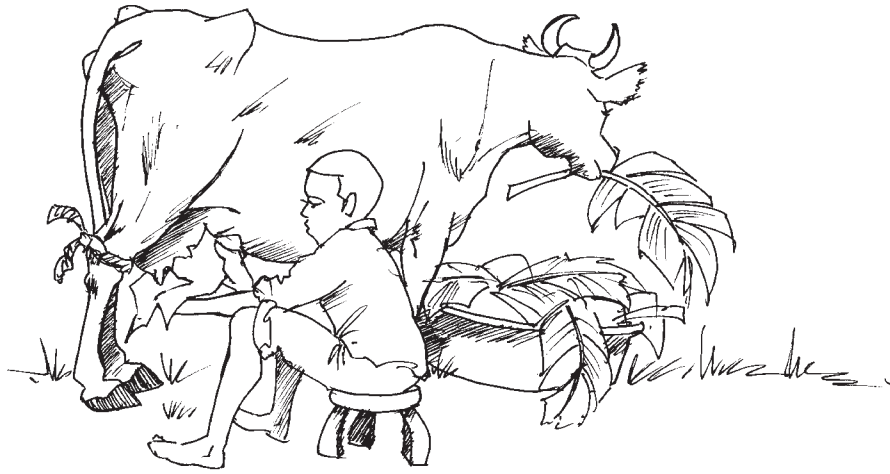
- Maintain clean and healthy cows
- Keep a clean milking environment
- Wash hands with soap and clean water before milking



- Wash the udder with a clean cloth and warm water

- Dry the udder with a clean dry cloth

- Make the first draw into a strip cup to check for mastitis and throw away from the milking area even if it appears clean



Wash udder with a clean cloth

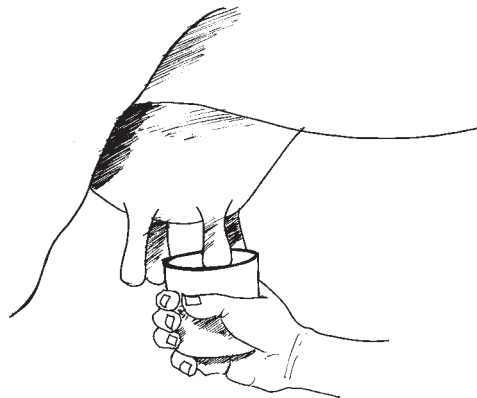


Make the first draw into a strip cup and throw away



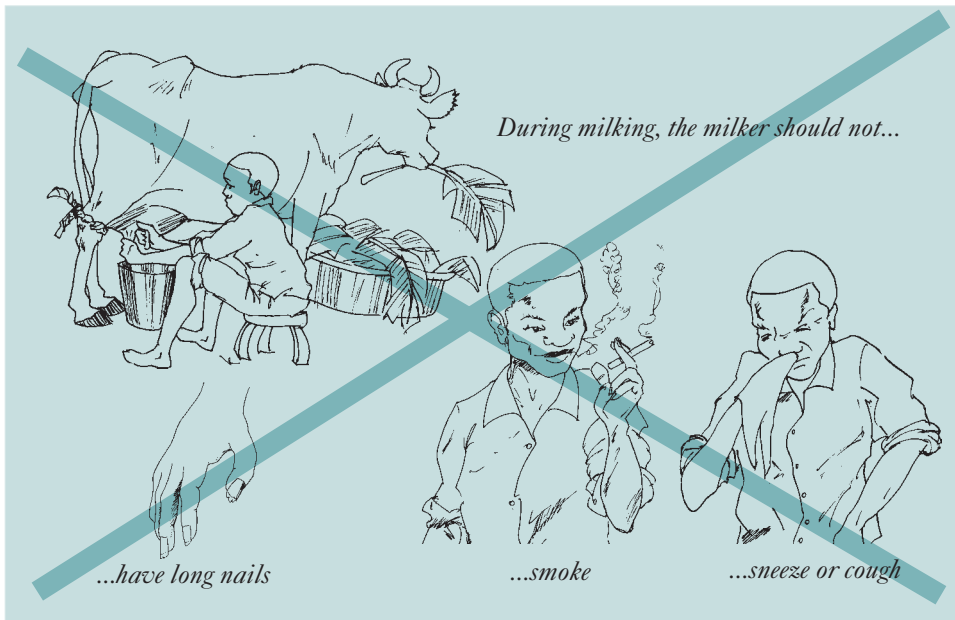
Use clean containers for milking

- Use clean containers for milking
- Cows with mastitis should be milked last and their milk discarded
- Milk from cows under antibiotic treatment should not be sold until 3 days after last treatment or as advised by the veterinarian
- After every milking, dip the teats into an “antiseptic dip”

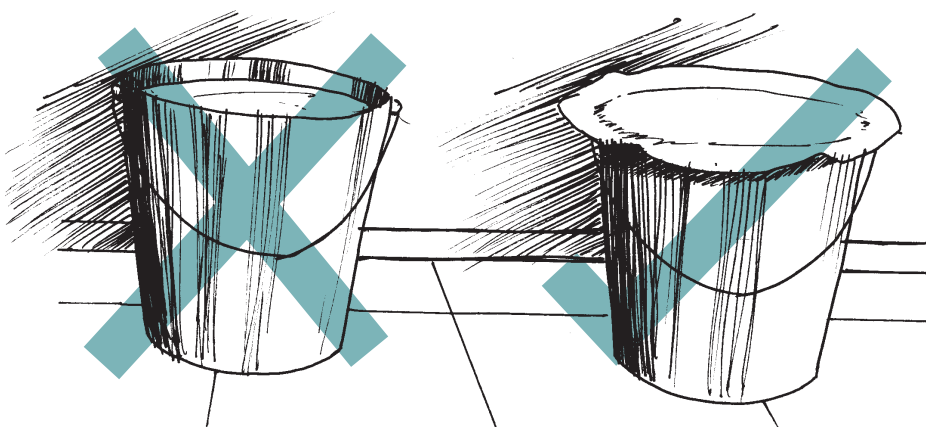


*After every milking, dip teats into
“antiseptic dip”*





- During milking, the milker should not:
a) have long nails, b) sneeze or cough, c) smoke
- Release the cow from the milking area as soon as milking is finished
- After milking, cover the milk to avoid contamination
- Move the milk to a clean and cool area



After milking, cover the milk to avoid contamination



2) Hygienic milk handling

Below are some practical guidelines that you should follow in order to ensure good milking hygiene;

Always use metal (e.g. aluminium) containers and not plastic containers.



When transferring milk between containers, pour, do not scoop. Scooping may introduce spoilage bacteria.

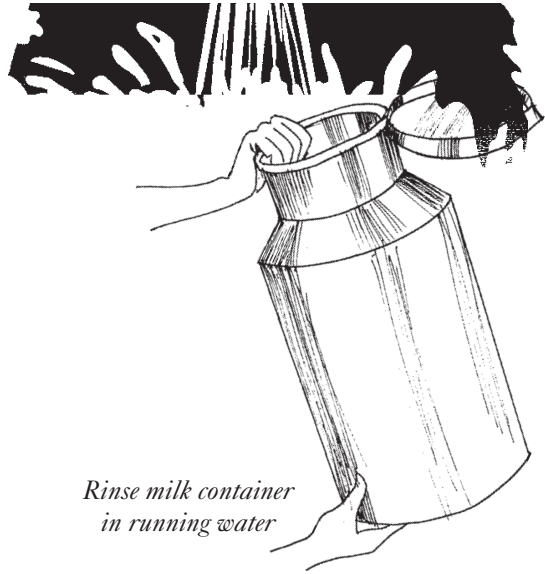


When transferring milk between containers, try to pour, not scoop



Before re-using the milk container,

- Pre-rinse the container soon after use
- Thoroughly scrub the container with warm water and detergent or soap (using a stiff bristled hand brush or scouring pad e.g “*Super-brite*”)
- Rinse the container in running water



Rinse milk container in running water



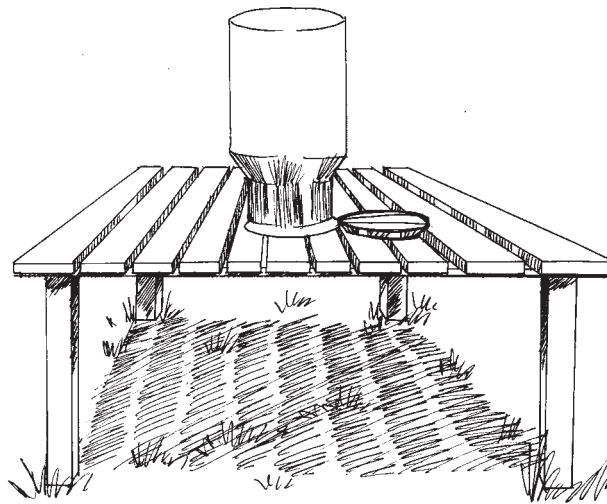
Thoroughly scrub the milk container with warm water and detergent or soap (using something like a stiff bristled hand brush or scouring pad)



- Dip-rinse the container in boiling water for at least one minute
- Air-dry the milk container in the open in inverted position



Dip-rinse container in boiling water for at least one minute



Air-dry milk container in the open in inverted position



3) How to test if milk is acceptable

During testing only a small amount (sample) of the milk is used. For the result of the test to give a true picture of the state of the milk, it is important to mix milk before obtaining the sample or testing.

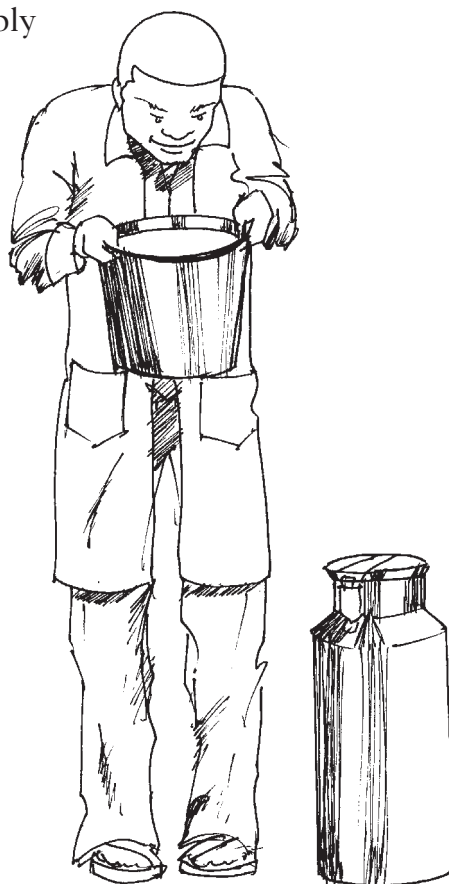
You can ensure that the milk that you receive from the farmer is of good quality by carrying out one or more of the following four basic tests.

i) Organoleptic test (Using your senses of sight and smell)

This test should be performed first. It simply requires the use of the senses of sight and smell to test the milk. It is easy and straightforward, allowing you to segregate poor quality milk before you receive it. Milk that cannot be adequately judged this way should be subjected to other more sensitive and objective tests. No equipment is required, but the milk tester must have good sense of sight and smell.

Procedure:

- Open a can of milk
- Immediately smell the milk and establish the nature and intensity of smell, if any. The milk may smell non-fresh or foreign odours may be detected



smell the milk

- Observe the appearance of the milk. Look at the colour of milk, any marked separation of fat, colour and physical state of the fat, foreign bodies or physical dirt
- Touch the milk container to feel whether it is warm or cold. This may indicate to you how long milk has taken since milking (if not chilled thereafter) and will influence the lactometer test for adulteration (see below)

Judgment:

Abnormal appearance and smell that may cause milk to be rejected could be due to:

- Type of feed or atmospheric taint
- Cows in late lactation
- Chemical taints or discolouring
- Advanced acidification or souring

Marked separation of fat may be caused by:

- Milk previously chilled and subjected to disturbance during transportation
- Adulteration with other solids (may also show as sediments or particles)
- Boiling, if milk fat is hardened

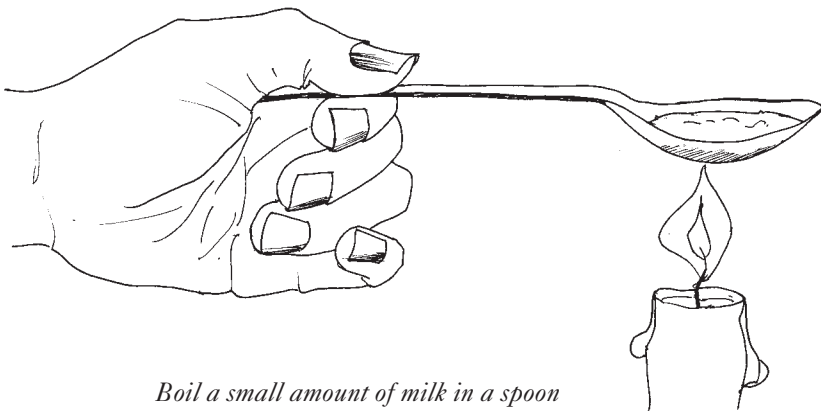


ii) Clot on Boiling Test

This test is quick and simple. It allows you to detect milk that has been kept for too long without cooling and has developed high acidity, or colostrum milk that has a very high percentage of protein. Such milk does not withstand heat treatment hence clot on boiling test could be positive at a much lower acidity.

Procedure and judgment:

Boil a small amount of milk in a spoon or other suitable container. If there is clotting, coagulation or precipitation, the milk has failed the test and should be rejected.



Boil a small amount of milk in a spoon

ii) Alcohol Test

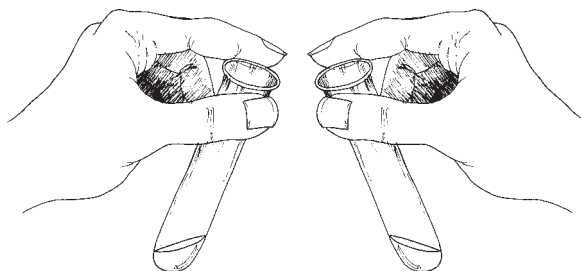
The test is quick and simple. The specific type of alcohol used is known as 'ethanol'. It enables you to detect bad milk that may have passed the previous two tests because it is more sensitive to lower levels of acidity. It also detects milk that has been kept for long without cooling, colostrum or milk from a cow with mastitis.

Procedure and judgment:

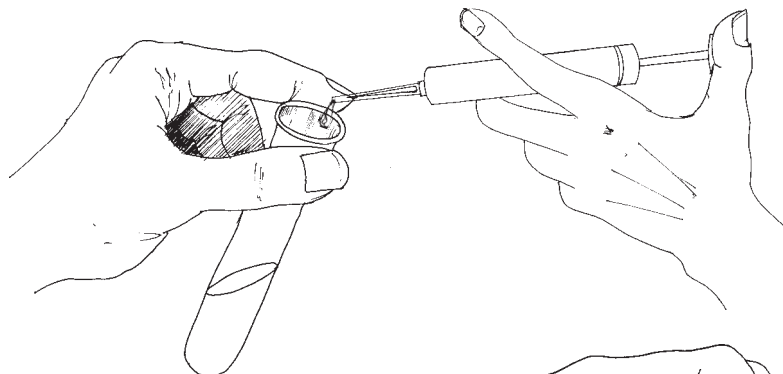
Use a syringe to draw equal amounts of milk and 70% alcohol solution in a small tube or glass cup (such as those used to administer medicine to children). Mix 2 ml milk with 2 ml 70% alcohol.



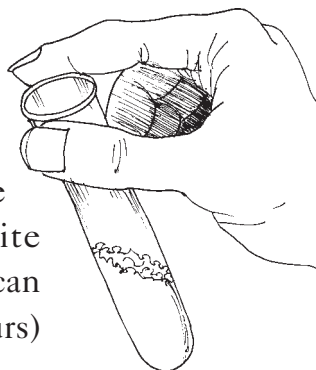
Use a syringe to draw equal amounts of milk



Mix 2 ml milk with 2 ml alcohol



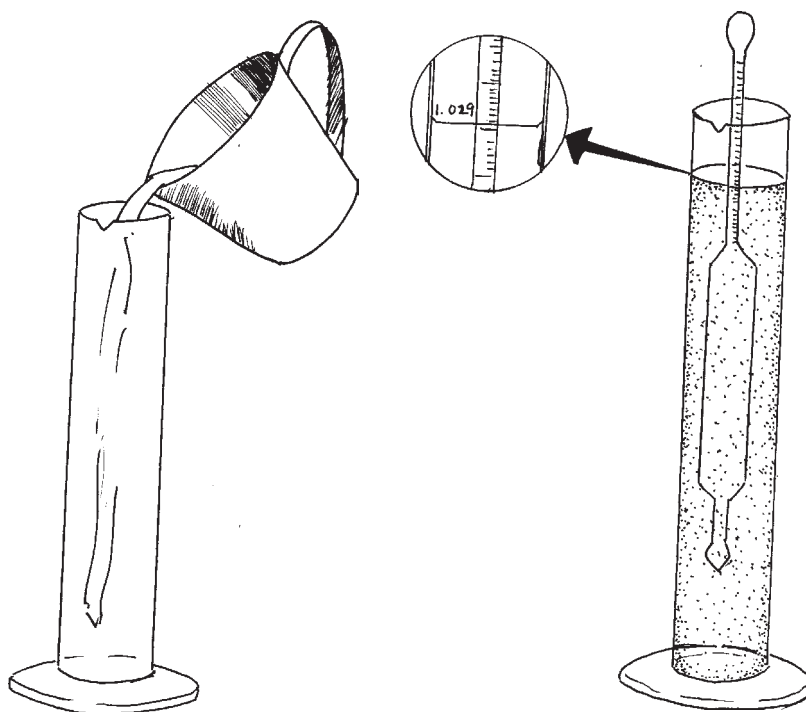
If the tested milk sample coagulates, clots or precipitates, it will have failed the test and the milk should be rejected. Because this test is quite sensitive, milk that passes this test can keep for some hours (at least two hours) before it goes bad.



sample coagulates, clots – failed the test

iv) Lactometer Test

Some unscrupulous milk suppliers adulterate milk with added water to increase the volume or added solids to make it look thicker. Addition of anything to milk can introduce bacteria that will make it spoil quickly. Adulteration of milk is also illegal. Here is how to test the milk to check whether it has been adulterated. The test is based on the fact that milk has a heavier weight or density (1.026 - 1.032 g/ml) compared to water (1.000 g/ml). When milk is adulterated with water or other solids are added, the density either decreases (if water is added) or increases (if solids are added). If milk fat (cream) is added to milk, the density becomes lower. The equipment used to determine milk density is called a lactometer. Most lactometers are usually marked from “0” (representing density of 1.000 g/ml) to “40” (representing density of 1.040 g/ml).



Equipment used for determination of milk density

Procedure:

Ensure that the milk has been left to cool at room temperature for at least 30 minutes and its temperature is about 20°C. Stir the milk sample and pour it gently into a 200ml measuring cylinder (or any container deeper than the length of the lactometer). Let the lactometer sink slowly into the milk. Take the lactometer reading just above the surface of the milk.

If the temperature of the milk is different from the lactometer calibration temperature (20°C), then use this correction factor: For each °C above the calibration temperature add 0.2° lactometer “degrees” (°L) to the observed lactometer reading, and for each °C below calibration temperature subtract 0.2° lactometer “degrees” (°L) from the observed lactometer reading. These calculations are done on the lactometer readings i.e. 29 instead of the true density of 1.029 g/ml.

Example of how to calculate the true lactometer readings when the milk temperature differs from the lactometer calibration temperature of 20°C.

Sample	Milk temperature °C	Observed Lactometer reading °L	Correction °L	True Lactometer reading °L	True density g/ml
No.1	17	30.6	- 0.6	30.0	1.030
No.2	20	30.0	Nil	30.0	1.030
No.3	23	29.4	+ 0.6	30.0	1.030
No.4	20	29.0	Nil	29.0	1.029
No.5	21	29.8	+ 0.2	30.0	1.030
No.6	19	29.2	- 0.2	29.0	1.029



Judgment:

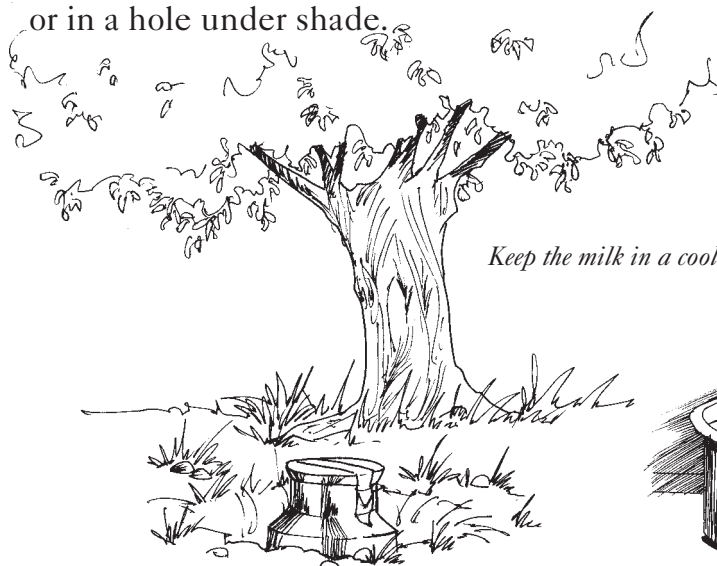
Normal milk has a density of 1.026 -1.032 g/ml (or 26 - 32 on the lactometer reading). If water has been added, the lactometer reading will be below 26. If any solid such as flour has been added, the reading will be above 32.

v) Other Tests

There are other advanced tests that are beyond the scope of this course. These tests are more sensitive but they are not practical within the circumstances of most small-scale traders. Ask your trainer if you wish to know them or refer to the text listed in the section on “other sources of information”.

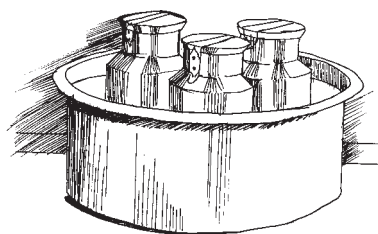
4) How to preserve milk to reduce spoilage

In order to ensure that you further increase the shelf life of your milk after receiving it, you need to keep it in a cool place. Lowering of milk temperature reduces “speed” (rate) of bacterial growth. If you do not have a refrigerator, you may keep the milk in cold water or in a hole under shade.



in a hole in a shade

Keep the milk in a cool place



in cold water

Lastly, ferry your milk quickly to your customers and make them happy. Remember that spoilage bacteria multiply very quickly in warm temperatures.

Remind them to always boil milk before drinking it.

*Ferry your milk quickly
to your customers*



Remind the customer to always boil milk before drinking it



REMEMBER

- ➔ **Proper hygiene practice in milk production and handling is key to the longer shelf life of milk**
- ➔ **Cooling of milk will slow down the multiplication of bacteria and prolong shelf life**
- ➔ **But milk that already has many bacteria in it will not keep as long even when cooled**
- ➔ **Better milk quality increases marketing profits**



OTHER SOURCES OF INFORMATION:

1. Milk Processing Guide Series Volume 2, FAO/TCP/KEN/6611Project. Training Program for Small-Scale Dairy Sector. Dairy Training Institute, Naivasha.
2. Code of Hygienic Practice for Production, Handling and Distribution of Milk and Milk Products Kenya Bureau of Standards, Nairobi.
3. Rural Dairy Technology, ILRI Manual No.1. International Livestock Research Institute, Nairobi.
4. Milk Producer Group Resource Book - a practical guide for establishing milk producer groups. FAO, 2002.
5. Milk Payment Resource Book- a practical guide for using incentives to improve milk quality. FAO, 2004.



Notes

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